2004-01-2322

Some New Results in the Green's Function Method for Ion Beam Transport

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ABSTRACT

The development of a Green's function approach to ion transport greatly facilitates the modeling of laboratory radiation environments and allows for the direct testing of transport approximations of material transmission properties. Using this approach radiation investigators at the NASA Langley Research Center have established that simple solutions can be found for HZE ions by ignoring nuclear energy downshifts and dispersion. Such solutions were found to be supported by experimental evidence with HZE ion beams when multiple scattering was added. Lacking from the prior solutions were range and energy straggling and energy downshift and dispersion associated with nuclear events. In a more recent publication it was shown how these effects can be incorporated into the multiple fragmentation perturbation series. Analytical approximations for the first two perturbation terms were presented and the third term was evaluated numerically. We now exhibit an analytical approximation for the third perturbation term and then demonstrate the accuracy of our results.

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